Headquarters U.S. Air Force

Integrity - Service - Excellence

AFPAM 91-211 USAF Guide to Aviation Safety Investigation

Lt Col Tom Luna
HQ USAF Safety Center Surgeon

U.S. AIR FORCE

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OVERVIEW

- **Preparation for Mishap Response and Investigation**
- **Interim Safety Board (AFI 91-204)**
- **Safety Investigation Board (AFI 91-204)**
- **Accident Investigation Board (AFI 51-503)**

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WHY INVESTIGATE MISHAPS?

- **The Purpose of the Safety Investigation is to Determine all Factors (Human, Material, Environmental) that Contributed Directly or Indirectly to the Mishap**

To PREVENT Mishaps!

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WHY USE AFPAM 91-211?

- Works Like a “Decoder Ring”
- Key to Successful Investigation
- Nondirective in Nature
- Helps Investigator Establish Continuity

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PREPARATION, RESPONSE AND INVESTIGATION

- Disaster Response not Safety responsibilities
- Wing Owns Disaster Response Force (DRF)
- DRF: Command Post, Control Centers, Disaster Control Group (DCG), Specialized Elements
- Two Plans: On-Base and Off-Base Response

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On-Base DRF

- **Initial Response**
  - **Fire, Medical, Security Forces**
  - **On Scene Commander (OSC) Adds as Required**
- **Follow on**
  - **Readiness, CE, BEE, Maintenance, EOD, PA, Safety**
  - **Mortuary Affairs, Transportation, Chaplin, JA, Photography, FM**
  - **Additional Medical, Security as Needed**

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Off-Base DRF

- **Initial Response**
  - **OSC, Fire, Medical, Security Forces, Safety, Photography, CE, Maintenance**
- **Follow-On Response**
  - **Readiness, BEE, EOD, PA, Mortuary Affairs, Transportation**
  - **Chaplin, JA, FM, Additional Medical, Security as Needed**

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COMMAND AND CONTROL AT SITE

- **OSC Sets Up Entry Control Point, Establishes Communication, Directs Activities and Services**
  - **Casualty Clearance**
  - **Helicopter/Ambulance Access**
  - **Security Forces**
  - **Fire Services**
  - **Engineering**
  - **Public Affairs**

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It Starts With a Plan

- **Work it out <u>ahead of time</u>!**

- **Jurisdiction for human remains**
- **Local civilian MTFs for survivors**
  - **Tox testing**
  - **Access for medical investigators**
- **Bloodborne pathogen program**
  - **Search & Recovery Team/Mortuary Affairs**
- **IDMT for care of responders/investigators/SPs etc**
- **Protocols/OIs for tox/lab/radiologic studies**
- **Templates for 72h and 14d histories**

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INTERIM SAFETY BOARD

- **Convened by Individual Wing or Group Commanders to Provide an Organized, <u>Evidence Preservation-Oriented Response</u> to Major Mishaps Within an Area of Responsibility Before the Arrival of the SIB.**

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INTERIM SAFETY BOARD

- **Composition Varies, But Must Include**
  - **President**
  - **Investigating Officer**
  - **Pilot Member**
  - **Maintenance Member**
  - **Medical Member**
  - **Recorder**

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INTERIM SAFETY BOARD RESPONSIBILITY

- Gather, Preserve and Protect Evidence
- Determine What is Evidence
- Analyze if Evidence Will Perish Before SIB Arrives
- **DO NOT DISTURB EVIDENCE IN AN ATTEMPT TO DETERMINE CAUSE**

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INTERIM SAFETY BOARD RESPONSIBILITY - DOC

- **Preserve Highly Perishable Evidence**
- **Gather Forensic Evidence (AFIP)**
- **Liaison for AFIP**
- **Participate <u>if Practical</u> in Autopsies**
- **Work with JA, Mortuary Affairs & MDG/CC on Jurisdiction Issues**

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What Evidence Are You Interested In?

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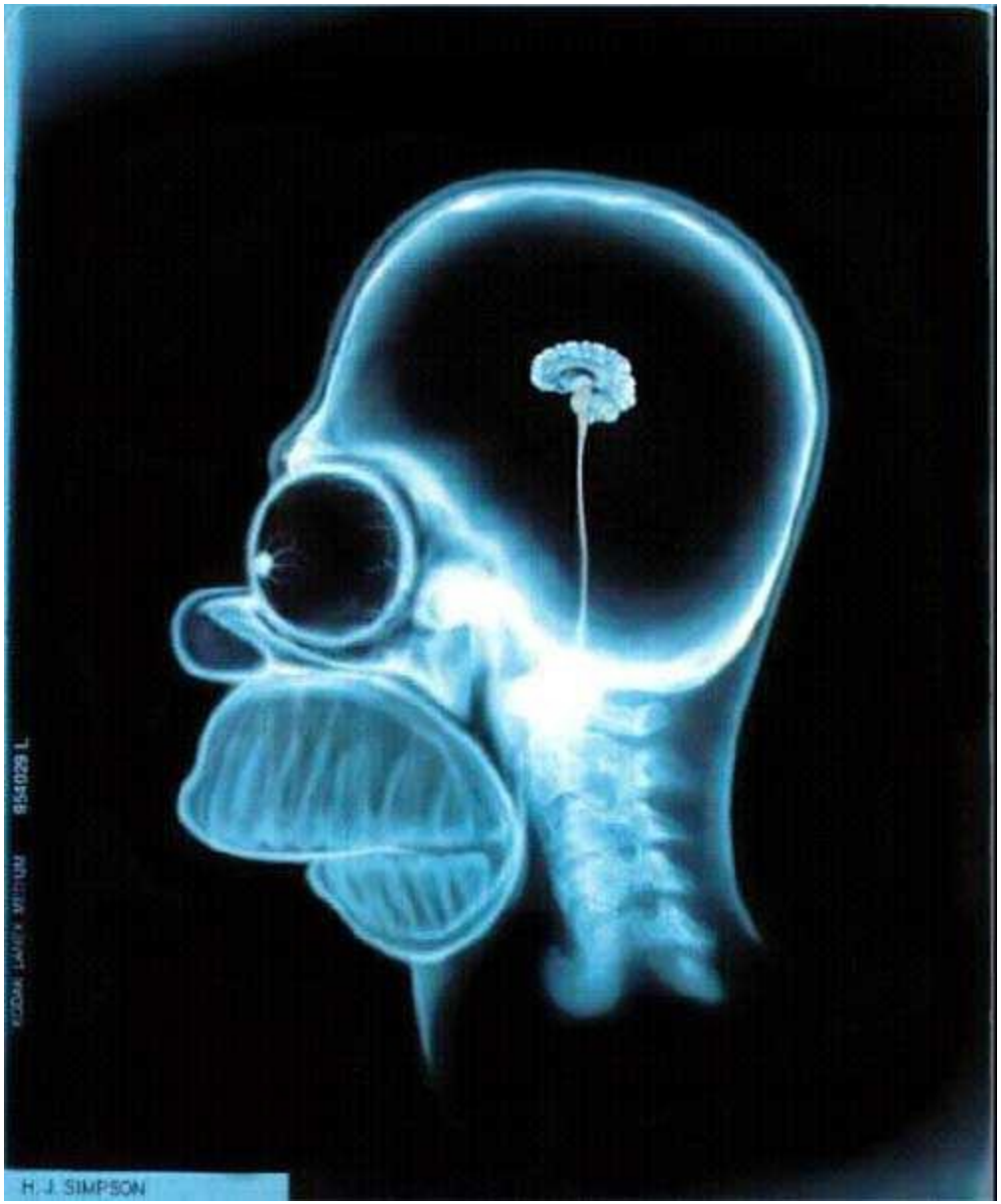
What Evidence Are You Interested In?

- **Body**
  - **Autopsy**
  - **Physical exam**
  - **Tox tests & other labs**
  - **Radiologic studies**
- **Memory**
  - **72h hx**
  - **14d hx**
  - **Initial interview**
- **Charts**
  - **Medical**
  - **Dental**
  - **Mental Health**
  - **Fam Adv**
  - **Substance Abuse**
- **Life Support/Personal Equipment**
  - **Ejection seat, helmet, flight suit, g-suit, gloves, boots, oxygen equipment, etc**

INTERIM SAFETY BOARD

- **Medical Member Responsibility**
  - **Post-Mishap Medical History, Physical Exam, Toxicology Testing and Care of Crewmembers**
  - **Collect/Sequester Charts:**
    - **Medical**
    - **Dental**
    - **Mental Health**
    - **Substance Abuse**
    - **Family Advocacy**
  - **Work With Mortuary Affairs to Ensure Human Remains are Photographed, Preserved and Documented**
  - **Liaison Between Local Medical Authority/Coroner and Military Investigators and AFIP**

- **Tasks:**
  - **Document injuries of all crew on SF88**
    - **Full spinal radiographs for all ejections/bailouts/crashes**
  - **Collect 72 hour and 14 day histories**
  - **Collect medical & dental charts**
  - **Sequester mental health, family advocacy & substance abuse charts**
  - **Initiate toxicology sample collection & other labs**
  - **Prepare to pass info to permanent board**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TOX Testing ROE

- Ensure medical facility follows “chain of custody” outlined in AFI 44-120
- For Class A and B aircraft mishaps test flight crews
  - **Consider relevant ground crew incl. air traffic control, maintainers etc.**
- For Class A, B, or C mishaps test individuals whose actions or inactions, in the Commander’s judgment may have been a factor
- Contractors……
  - **By consent or if a provision of the contract**
- DoD civilians… **See AFI 91-204 Chapter 1!!!**

Questions: call Safety Center/JA
DSN 246-1559

Mishap Investigation
Toxicology Testing

- **Survivors**
  - **Use betadine to draw NOT alcohol swab**
  - **Blood ETOH, GLU, CO, HCT, HGB, Drug Screen, U/A**
    - **AFIP only does drugs of abuse, others on request**
  - **14-20 ml of each RED tops, GRAY tops, LAVENDER tops, 70 ml urine**
  - **10ml RED top and 10 ml urine frozen for backup**
- **Fatal**
  - **Best collected at autopsy**
  - **100 gm of liver, 100-200 gm of brain, 50 gm each of kidney, lung, gastric**
  - **All available bile and vitreous**
  - **100 ml or all available blood and urine**

Follow AFIP guidelines – download from:
http://www.afip.org/Departments/oafme/tox/tox.html

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Initial Interviews

- **Mishap Crew and relevant Ground Crew**
  - **72 Hour Hx**
  - **14 Day Hx**
  - **Record/document initial interv**
    - **Reattack with Interim Investig. Officer if you need more DATA**

target of opportunity

- **YOU ARE NOT INVESTIGATING**
- **COLLECT AND PRESERVE EVIDENCE**

Open ended questions only;
let them tell their story totally without interruption or correction;
specifics will come out on follow up interviews

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72 hr & 14 d Histories

72 hr History

- Specific details…
- Sleep
- Work schedule
- Recreation
- Meals & snacks (as detailed as possible)
  - Fluid intake
  - Alcohol
- Medications
- Waivers
- Diet?
- Herbals/nutritional suppl.
- Tobacco

14 d History

- More broad…
- Circadian rhythm impacts
  - Duty/shift schedule
  - Travel
- Illnesses
- Social
- Emotional
- Financial
- Vacation
- Education
- Extra duties

Best reference: AF PAM 91-211 A4.7.10

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Site Hazards

- Environmental Hazards
  - Hot, cold, sun, wind, rain, snow, “critters”
- Material Hazards
  - Composites
  - Explosives (Ammo, pyrotechnics, etc)
  - Pressure Vessels (tires, O2 cylinders, etc)
  - Sharp Edges
- Biological Hazards
- Fire Hazards
  - Fuel
- Radioactive Hazards
  - Control Surface Counterweights = depleted uranium
- Pyrotechnics & Ammunition on/in remains & personal gear

Ensure all responders – incl Search & Recovery Team - are included in your Bloodborne Pathogens Program

OTHER HAZARDS ASSOCIATED WITH AIRCRAFT MISHAPS

- **Toxicology Injury – Inhaled, Ingested or Cutaneous Contact**
- **Thermal Injury – Freeze or Burn**
- **Asphyxiation Injury – Oxygen Displacement**
- **Radiation Injury – Emissions of Ionizing Agent**

OTHER HAZARDS ASSOCIATED WITH AIRCRAFT MISHAPS

- Disease – Microbiological Agents
- Mechanical Injury – Explosive Fragments, Rocketing Containers, Explosive Overpressure
- EXAMPLES – Tires, Batteries, Beryllium Mirrors, High Pressure Oxygen Bottles, Hydraulic Accumulators

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Site Hazards

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Site Hazards

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Site Hazards

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Site Hazards

- **Know what hazards you are dealing with!**
- **Hazard ID – Survey the Site!**
  - **Toxic substances unique to the aircraft**
- **Use PPE**
- **Limit access to site, brief all on hazards**
- **Don’t put your hand in a place when you can’t see what’s in there!**

Ensure those on-site have accessible medical care …IDMT available?

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Mishap Investigation
Protection at the Mishap Site

- **Flight Surgeon Requirements per AFPAM 91-211**
  - **Inform investigators of hazardous exposures**
  - **Set personal protective equipment (PPE)**
  - **Inform board when ID threat is gone**
- **PPE for site with human remains**
  - **Safety or prescription glasses**
  - **3M style mask (HEPA mask better)**
  - **Surgical gloves under leather gloves**
  - **Impervious coveralls**

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Mishap Investigation
Protection at the Mishap Site

- Composites and other special material
  - Consult local BEE and AFM 32-4004
  - Composites web site –

tps://www.afms.mil/afiera/rsh/IndustrialHygiene/hammer.ht
Go to "Downloads", RealPlayer
then "Mishap Response for Advanced Composites"

- Aircraft Hazardous Material Inventory Adobe Acrobat
  http://137.244.215.33/ti/tilta/documents/to00-105E-9.htm

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Critical Incident Stress Team

- **Ensure Critical Incident Stress Team is formed and works with all responders**
- **Usually coordinated by chapel and mental health**
- **Have available at mishap location**
- **Surviving aircrew should receive CISM *in***

AFI 44-153, Critical Incident Stress Management

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Critical Incident Stress Team

Don't forget…

- **Fire dept**
- **Security police**
- **Medics**
- **Photographers**
- **Services personnel (serving as mortuary affairs)**
- **Wingman – other operators**
- **Witnesses**
- **Search & Rescue personnel**
- **Family Liaison Officer**
- **Surviving aircrew**

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Mishaps With Fatalities

- **Local Coroner vs. Flight Surgeon**
  - **Coroner/ME usually has jurisdiction on/off base**
    - **Dictated by MOUs & State Laws**
    - **Clarify <u>BEFORE</u> there is a mishap**
  - **Flight Surgeon "over-the-shoulder"**
  - **Call in AFIP**
    - **Autopsies and remains identification**
- **Know Your Mortuary Affairs Officer**

Mishaps with Fatalities

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Mishaps With Fatalities

- **Family Notification and Survivor Assistance**
  - **<u>Not</u> an ISB-FS function…Mortuary Affairs is responsible (but FS usually on notification team)**
  - **AF policy is to ensure that NOK and family members receive as regular as possible a flow of releasable investigation information; <u>comes from the AIB president & Family Liaison Officer – NOT the ISB/SIB</u>**
  - **Procedures outlined in AFI 34-1101, Assistance to Survivors of Persons Involved in Air Force Aviation Mishaps**

T*A*P*S – Tragedy Assistance Program for Survivors
1 800 959-TAPS 24 hr assistance

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Mishaps With Fatalities

- **Information flow…**
  - **1. SIB to AIB (factual, “investigation information”)**
  - **2. AIB to MAJCOM**
  - **3. MAJCOM to Wing CC/Family Liaison Officer**
  - **4. Wing CC/Family Liaison Officer to Families**

- **Family Liaison Officer (FLO)**
  - **Should be crew counterpart**
  - **Daily contact with family until funeral completed**
  - **“Periodically” until AIB complete**
  - **Required to protect privilege**
  - **Present the “facts”… resist temptation to “solve” mishap**
  - **Remember them for CISM!**

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INTERIM BOARD HAND-OFF

- ISB President conducts the handoff
  - Overview of all known facts
  - Actions accomplished to date
- All evidence must be accounted for-- checklist works well
- Each board member should meet with counterpart to determine additional evidentiary requirements
- Once handoff complete ISB members return to normal status, but need to be available in the short term if questions arise

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SAFETY INVESTIGATION BOARD

- Qualifications are Established by AFI 91-204 for the Board President and Investigating Officer
- All Others…"Good-on-You" Qualifications
- Courses Available: FSO*, AMIC*, JEMIC*, LSO*, LS- Superintendent Course*, AMIP

* Required for Board Selection as IO, MX, LSO Member

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SAFETY INVESTIGATION BOARD

- **MAJCOM is Authority – Board Works for 4 Star**
- **SIB Membership - Primary**
  - **Board President**
  - **AFSC Representative**
  - **Investigating Officer**
  - **Pilot Member**
  - **Maintenance Member**
  - **Medical Member**

SAFETY INVESTIGATION BOARD

- **SIB Membership - NonPrimary**
  - **Commanders Representative (NP)**
  - **Recorder (NP)**

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SAFETY INVESTIGATION BOARD

- SIB Membership – Required NonPrimary (if involved)
  - Life Support Member
  - Weather
  - Air Traffic Control
  - Human Factors Consultant
    - Aerospace Physiologist
    - Aviation Psychologist
    - Pilot-Physician
- Board President Decides Participation Level

SAFETY INVESTIGATION BOARD

- **IF YOU HAPPEN TO BE LOCAL…DO NOT CONTINUE WORK AT AEROSPACE MEDICINE CLINIC…CUT TIES FOR THE DURATION OF SIB!**

AIR FORCE SAFETY CENTER REPRESENTATIVE

- **Investigation Process Expert**
- **Investigation Techniques Expert**
- **Investigation Resources Expert**

USE THEM WISELY IN ALL THAT YOU DO!

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STUFF TO THINK ABOUT

- **Personal Kit:**
  - **Orders**
  - **Expense Record**
  - **Immunization records**
  - **Checkbook/Government Credit Card**
  - **Passport**
  - **Appropriate Clothing**

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REVIEW PRIORITIES

- Human Remains and Toxicology
- Fluid Samples: Oil, Fuel, Hydraulic
- Gas Samples
- Flight Data Recorders
- Cockpit Voice Recorders

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REVIEW PRIORITIES

- HUD Recordings
- ATC Tapes
- ACMR or ACMI Tapes
- Radar Tapes, Photographs, Site Survey

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INITIAL ACTIONS

- Site Familiarization Walk-Through
- Site Assessment
- Site Preservation
- Disposition of Human Remains
- Disposition of Wreckage

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INITIAL ACTIONS DOC'S JOB

- **Clarify Jurisdiction for Human Remains**
- **Weigh Humanitarian, Jurisdictional and Practical Reasons to Remove Human Remains**
- **Protect Against Bloodborne Pathogens**

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INITIAL ACTIONS DOC'S JOB

- **Assist in Site Diagram Only as it Relates to Human Remains**
- **Photograph Aircraft Structures, Life Support and Escape Equipment Intimate with Remains**
- **You Work <u>With</u> Mortuary Affairs**

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SIB RESPONSIBILITY: MEDICAL MEMBER

- **Download Life Sciences Report**

www.safety.kirtland.af.mil/afsc/rdbms/flight/sefl/lifedown.html

- **Take Copious Notes**
- **Call Human Factors Consultant Early**
- **Validate Required Specimens Captured**
- **Validate AFIP Toxicology Captured and Sent**

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SIB RESPONSIBILITY: MEDICAL MEMBER

- **Follow-up, Follow-up, Follow-up, Follow-up**

www.afip.org/oafme/afmi.html - Forensic Toxicology

www.afip.org/oafme/tox/toxguide98.pdf - S&H

www.afip.org/oafme/tox/1323blank.pdf - Tox Request

www.afip.org/oafme/tox/contents.html - Spec. Type

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SIB RESPONSIBILITY: MEDICAL MEMBER

- **Life Sciences Equipment Forensic Laboratory**
- **Survivability Analysis**
- **Injury Analysis**
- **Initial Personal History**
- **Unit Culture**

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SIB RESPONSIBILITY: MEDICAL MEMBER

- **Start TAB Y on Day One of Board**
- **TAB Y is NOT a Stand Alone Document**
- **TAB Y Supports TAB T Analysis and Investigation**
- **Continue to Update TAB Y Throughout SIB Process**
- **Participate in All Meetings**
- **Write for the SIB – not yourself**
  - **It's the SIB's tab Y – it ISN'T a minority report**

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TURNOVER TO AIB……

- **Wing CC “Courtesy Outbrief”**
- **Turnover to the AIB….**
  - **All Non-privileged/factual Data to Include….**
  - **Wreckage, Part One of the Report/original Documentation, Parts Locations, Witness List, Etc.**
  - **CVR Tapes, ATC Tapes, Air to Air Tapes, Etc**
  - **Coroners Reports, TOX Testing, Autopsy Protocols, Post Mishap Medical Examination (Only O in SOAP Note)**

Note: for Space Mishaps, AIB & SIB Formed at Same Time, Non privileged Factual Data Provided to AIB ASAP

Turnover to AIB……

Example Turnover Letter

MEMORANDUM FOR PRESIDENT, AFI 51-503 ACCIDENT BOARD

FROM: Safety Investigation Board

SUBJECT: Inventory and Witness List, Class A Mishap, 2 x F-15A, 76-0117 & 77-0118, 19 Aug 99

1. The following items are released to the AFI 51-503 Accident Investigation Board:

a. Part I of the Formal Safety Report of subject mishap

b. List of witnesses (Atch 1).

c. Aircraft wreckage (Atch 2).

d. Medical and dental records.

e. Engine and aircraft records.

f. All negatives of releasable photographs.

g. Aircrew records.

h. Life support records.

2. Please reply by indorsement below that you are in receipt of these items and take responsibility for their final disposition.

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TURNOVER TO AIB……

- **Weak Areas……**
  - **Incomplete Witness List**
  - **Video Simulations Are <u>Privileged</u> If They Are**
  - **72 Hour/14 Day History Is <u>Privileged</u>**
- **What If the AIB Not Present When Ready to Release SIB?**

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HISTORICAL OBSERVATION

- **Don’t Walk Into the SIB Room with a Rambo Knife**
- **Be Prepared, Flexible and <u>BE A TEAM PLAYER</u>**
- **Live, Work and Play with the SIB**

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HISTORICAL OBSERVATION

- **Take Criticism and Disregard Ownership Rights to Your Written Document – You are Only One of Many, and Not Very Important in the Big Picture**
- **Make Your Point When it Makes a Difference**
- **Speak Pilot Talk When Appropriate**

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HISTORICAL OBSERVATION

- **Don’t Speak Pilot Talk when You Can’t Spell HUD, BFM or CRM**
- **Don’t Write in “Doctorbabble or Psychobabble”**
- **Don’t Chase the “Golden BB”, You May Buy the Bar**

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HISTORICAL OBSERVATION

- **Don’t Wear a Flight Suit That Looks Like You Slept in it!**
- **Nobody REALLY Wants to See Autopsy Pictures**
- **Have Your Class A’s in Order for the MAJCOM Brief**

SUMMARY

“Be Prepared to Spend the Most Intense, Exciting, Stressful, Demanding, Humiliating, Educational, Team Building 35 Days of Your Life. Remember, If You Don’t Have the Right Frame of Mind Going Into the SIB You Will be Left for the Vultures to Eat.”

Twodogs, 2001

Careful…

Be careful of the tendency to rush to judgement.
Be afraid of overlooking inconspicuous but crucial items.

"What I have to always keep in mind… is that sixty five human beings died in that crash. Now, what is the objective? Not just concocting a plausible explanation but doing a real job of prevention.
It mustn't happen again the same way.
If I overlook anything…*Jesus!*
The next one will be my fault.
I *have* to keep my mind completely open."

Joseph A. Fluet quoted in "The Case of Flight 320" by Morton Hunt; ISASI forum Nov 89

Questions?

“Whenever we talk about a pilot who has been killed in a flying accident,

we should all keep one thing in mind. He…made a judgement.

He believed in it so strongly that he knowingly bet his life on it.

That his judgement was faulty is a tragedy…

Every instructor, supervisor, and contemporary who ever spoke to him

had the opportunity to influence his judgement,

so a little bit of all of us goes with every pilot we lose.”

Anonymous